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An adult canine model of progressive left ventricular pressure overload.

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This article details the development of a model of progressive left ventricular pressure overload (LVPO) in the adult dog. LVPO was induced by banding the proximal ascending aorta in 69 adult conditioned dogs. The base of the aorta was exposed through a right thoracotomy. A tunnel was created by blunt dissection between the aorta and pulmonary arteries. An aortic band was constructed by passing umbilical tapes through the lumen of gortex tubing. This band was placed through the tunnel, then tied around a balloon dilatation catheter. The distal end of the balloon catheter was closed with an injection cap and positioned in a subcutaneous pocket. Aortic stenosis was induced by filling the balloon catheter with saline. A predetermined amount of LVPO was created by adjusting the amount of aortic stenosis. At 2, 4, and 6 weeks after aortic banding the LVPO was increased by transcutaneous injection of saline into the balloon catheter. At 8 weeks the dogs were evaluated for sufficiently decreased cardiac contractility and used acutely in one of several studies. The article also discusses perioperative management, postoperative care, and complications that were encountered during the development of the model. Postoperative pain was managed by the combined use of preemptive and postoperative opioids, local nerve blocks, and nonsteroidal anti-inflammatory drugs. Notable intraoperative complications included atrial and ventricular arrhythmias and pulmonary artery laceration during the banding procedure. The most significant postoperative complications were aortic ruptures and congestive heart failure. The success rate of this model has increased from 20% (year 1) to 65% (year 3). This success has been attributed to improvements in band design, surgical technique, and postoperative management.